



SEP 15 2005

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802- 4213

MEMORANDUM FOR: Scientific Research Permit No. 1280; 151422SWR2003SA9034:BSK

FROM:

Rodney R. McInnis
Regional Administrator

SUBJECT:

Addendum to the Central Valley Programmatic Biological Opinion for
Scientific Research

I. CONSULTATION HISTORY

Section 10(a)(1)(A) of the Endangered Species Act of 1973, as amended (ESA), provides NOAA's National Marine Fisheries Service (NMFS) with the authority to grant exceptions to the ESA's "taking" prohibitions for scientific research (see regulations at 50 CFR 222.301 through 222.308, and 50 CFR 224.101 through 224.102). Scientific research or enhancement activities must: (1) be applied for in good faith; (2) if granted and exercised, not operate to the disadvantage of the endangered species; and (3) be consistent with the purposes and policy set forth in section 2 of the ESA (50 CFR 222.303(f)). NMFS prepared this addendum to the Central Valley Programmatic Biological Opinion for Scientific Research (Central Valley Research Opinion, NMFS 2003a), signed on September 5, 2003, in compliance with section 7(a)(2) of the ESA, as amended (16 U.S.C. 1536).

On October 11, 2000, the Turlock Irrigation District (TID) submitted a request to NMFS for a research permit to monitor the distribution and abundance of Central Valley steelhead (*Oncorhynchus mykiss*) in the lower Tuolumne River, including collecting scales and physical measurements from individual fish. NMFS published a notice of receipt of TID's request in the *Federal Register* on November 28, 2003, announcing the beginning of a thirty day public comment period. On March 8, 2004, NMFS advised TID that it had received comments on the permit proposal. Two reviewers commented primarily about concerns with the study methodology and the anticipated take of Central Valley steelhead. On April 5, 2004, TID forwarded a response to the reviewer comments to NMFS, clarifying in more detail the methodology that would be used and the amount or extent of take anticipated for Central Valley steelhead.

II. DESCRIPTION OF THE PROPOSED ACTION

In 1995, lower Tuolumne River stakeholders entered into a settlement agreement with the Federal Energy Regulatory Commission (FERC; TID and the Modesto Irrigation District (MID) 1996). As part of ten restoration projects required by the FERC settlement agreement (FSA, section 12), the following river-wide monitoring objectives were established:



- Estimate the survival of Chinook salmon outmigrants passing through specific reaches of the Tuolumne River (FSA section 13(d)(f));
- Estimate the number, size, distribution, and timing of naturally-produced fry and juvenile Chinook salmon migrating out of the Tuolumne River and the migration rate within the river (FSA section 13(c)(d)(e)(f)(g)); and
- Assess the relationship between outmigration patterns (*i.e.*, the number, size, timing, and rate) of naturally-produced Chinook salmon and flow fluctuation patterns and other environmental variables (FSA section 13(d)(e)).

In conjunction with the above objectives, TID is conducting studies to assess juvenile Chinook salmon density and distribution, monitor outmigration patterns, and assess predator populations. Activities to be conducted under Scientific Research Permit No. 1280 (Permit 1280) include seining surveys and rotary screw trapping that target juvenile Central Valley fall-run Chinook salmon (*O. tshawytscha*), and electrofishing that targets predator populations; fish stranding surveys to assess stranding and entrapment of naturally-produced juvenile Chinook salmon related to flow changes; and limited surveys involving the capture of juvenile and adult Central Valley steelhead using sport-fishing methods that are legal under California State law, and collecting fin-clips and scale samples for genetic analysis.

NMFS believes that an additional activity involving the measurement of gravel permeability in fall-run Chinook salmon redds over a 2-week period in the fall is not likely to adversely affect Central Valley steelhead. Because *O. mykiss* redds will not be affected and steelhead are unlikely to be encountered, this activity will not be discussed further in this document.

Under the authority of section 10(a)(1)(A) of the ESA, NMFS proposes to issue Permit 1280 to TID authorizing take of juvenile and adult Central Valley steelhead from the lower Tuolumne River in conjunction with the above activities. Permit 1280 would be in effect through December 31, 2010, and would be subject to the limitations of the ESA and the regulations in 50 CFR, parts 222, 223, and 224, for the period stated on the permit, unless it is modified, suspended, or revoked sooner.

A. Project Activities

1. Seining Surveys

The seining surveys are conducted every two weeks from January through May at about eight sites along the length of the lower Tuolumne River from river mile (RM) 0 to 50.2, and at about two sites on the San Joaquin River near the mouth of the Tuolumne River. The seines are 6 feet high, with 1/8-inch mesh nylon net in lengths of 20 or 30 feet. Seine hauls are made both parallel and perpendicular to stream flow. All captured fish are anesthetized with MS-222 (Schoettger and Steucke 1970), measured (fork length), and then revived in buckets of fresh water before release. Fish are held for approximately 10 minutes until they show signs of "normal" swimming patterns and behavior.

MS-222 is a widely used anesthetic for aquatic vertebrates because it is readily absorbed over gills. In small doses, MS-222 sedates the animal enough to allow for minimal handling and measurements. In larger doses, the anesthetic can be lethal and attention must be paid to size of fish and dosage given. Therefore, only experienced field crew members will be responsible for preparing the anesthetic and handling fish. Past work by the applicant indicates that salmonid injury or mortality due to seining will be rare.

2. Rotary Screw Trap Sampling

Two rotary screw traps (RSTs) are used by TID to sample fish in the Tuolumne River. The first trap usually is put in place near RM 40 in early January. The second trap is deployed near RM 25 in early April. The traps are operated until approximately the end of May. The RSTs are held in place by a 1/4-inch overhead cable attached to a pulley system and suspended over the river. The traps are operated up to 24 hours a day and 7 days a week. They are monitored at least once daily; captured fish are anesthetized, measured, and then revived according to procedures outlined above for handling seined fish.

3. Electrofishing Surveys

Electrofishing surveys are conducted during the fall, generally from September through November at six locations between RM 25 and RM 29. Electrofishing is conducted at night by backpack or boat in accordance with "Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act" (NMFS 2000). A minimum of three passes are conducted per site. During each pass, fish are held in live wells. After all passes are complete, fish are anesthetized, identified, counted, measured, revived and released. Although the current applied during electrofishing is not intended to harm or kill fish, the potential for physiological harm exists. This injury risk is minimized by having trained and experienced field crew personnel operating the electrofisher with the utmost attention for fish safety.

4. Stranding Surveys

Stranding surveys usually are conducted in the Tuolumne River within the reach from RM 20 to RM 50.2 from January through June, depending upon flow conditions and stranding potential. As the floodplain is dewatered, experienced field crews search for depressions that retain water and strand fish. Stranded fish are captured with dip nets or seines, measured and released into the main river. The applicant has indicated that injury or mortality during the rescue of stranded fish with seines or dip nets is rare.

5. Angling Activities

Central Valley steelhead will be caught with hook-and-line in the Tuolumne River and released in compliance with State recreational fishing regulations for resident rainbow trout (*O. mykiss*), including a stated zero creel limit. Sampling will occur January through June within the river reach from RM 30 to 50.2. Artificial lures with barbless hooks will be used. Angling and

obtaining tissue samples (*i.e.*, fin clips and scale samples to be used in genetic analyses) will be conducted by trained and experienced field crew personnel. This is the only proposed activity which is likely to involve the capture of adult (*i.e.*, as well as juvenile) Central Valley steelhead.

B. Action Area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR §402.02). For the purposes of this consultation, the action area includes the lower Tuolumne River from RM 0 at the confluence of the San Joaquin River upstream to RM 50.2 at La Grange Dam, and sampling sites on the San Joaquin River near the mouth of the Tuolumne River established through FSA.

C. Requested Amount of Take

TID requests permit authorization to annually capture and handle up to 20 juvenile Central Valley steelhead per year (*i.e.*, up to 5 juveniles per year per activity 1 through 4 described above) due to take from monitoring the Tuolumne River and San Joaquin Rivers for Central Valley fall-run Chinook salmon and predators. TID also requests authorization for annual nonlethal take of up to 20 juvenile or adult Central Valley steelhead per year through angling to acquire scale and tissue samples for research to separate resident rainbow trout from Central Valley steelhead. Therefore, research activities authorized under Permit 1280 will result in the nonlethal take of up to 40 Central Valley steelhead per year. Unintentional mortality is not expected to exceed 1 percent of the steelhead captured (*i.e.*, one fish).

The applicant reports that only 3 *O. mykiss* were captured during 2 previous years of implementing the proposed project as described, except for the angling activities targeting Central Valley steelhead, which comprise a new project element. The 3 *O. mykiss* were released; no mortality was observed.

D. Measures to Reduce the Impacts of Issuing Permit 1280

NMFS has reviewed the credentials of the principal investigators for the proposed research. All investigators are well qualified and have provided evidence of experience working with steelhead and the concepts outlined in the proposed permit (*e.g.*, seining, rotary screw trapping, electrofishing, hook-and-line capture, and data collection including length measurements, scale collection, gender examination, and location documentation). The following measures are to be implemented to minimize adverse impacts on Central Valley steelhead in the Tuolumne River during research activities:

- NMFS has developed nondiscretionary conditions for Permit 1280 (See Appendices A and B of the Central Valley Research Opinion) that are necessary and appropriate to minimize the effect of take on Central Valley steelhead. The investigators will ensure that all persons operating under Permit 1280 will be familiar with the terms and conditions therein.

- NMFS shall monitor project activities to ensure that the project is operating satisfactorily in accordance with Permit 1280. TID submits annual reports on their research activities concerning Central Valley fall-run Chinook salmon to FERC as part of the FSA, and will include numbers for take of Central Valley steelhead in the lower Tuolumne and San Joaquin Rivers in the annual reports. NMFS shall be provided copies of the annual reports, and will adjust annual permitted take levels if the level is deemed to be excessive or if cumulative take levels are determined to operate to the disadvantage of the Central Valley steelhead.
- All persons operating under Permit 1280 will be properly trained, have access to properly maintained collecting and sampling equipment, and operate all collecting gear pursuant to any NMFS guidance concerning such gear.
- Hooking injuries to the fish will be treated, as necessary, by applying pressure to the wound until any bleeding ceases while holding the fish in flowing water. The potential for suffocation will be minimized by frequently wetting the fish and its gills with river water while samples and measurements are taken. Prior to release, each fish will be held in flowing water so that water flows over its gills until it fully recovers and is capable of swimming. Fish will not be collected for sampling purposes when water temperatures exceed 60 °F.

III. STATUS OF THE SPECIES AND CRITICAL HABITAT

Central Valley fall-run Chinook salmon are not listed as endangered or threatened under the ESA, although NMFS has considered it a Species of Concern since 1997 (NMFS 2005a). Central Valley steelhead were listed as threatened under the ESA on March 19, 1998 (63 FR 13347), and critical habitat was designated on September 2, 2005 (70 FR 52488). This Evolutionarily Significant Unit (ESU) consists of steelhead populations in the Sacramento and San Joaquin River (inclusive of and downstream of the Merced River) basins in California's Central Valley. The research activities described in this document do not result in any changes or effects to salmonid habitat including critical habitat for Central Valley steelhead. Therefore, critical habitat is not likely to be affected by issuance of Permit 1280 and is not considered further in this document.

On June 14, 2004, NMFS proposed the following listing changes involving Central Valley steelhead populations (69 FR 33102): (1) the Coleman National Fish Hatchery and Feather River Hatchery steelhead populations were proposed for inclusion in the listed population of steelhead (these populations were previously included in the ESU but were not deemed essential for conservation and thus not part of the listed steelhead population); and (2) all resident *O. mykiss*, present below natural or long-standing artificial barriers, were proposed to be included as part of the listed steelhead ESUs. On June 28, 2005, NMFS announced that the final decision on these steelhead proposals has been deferred for six months for further scientific review (70 CFR 37160).

The issuance of Permit 1280 may potentially affect Central Valley steelhead. The Central Valley Research Opinion (NMFS 2003a) describes the life history and status of the Central Valley steelhead ESU. Steelhead historically were well-distributed throughout the Sacramento and San Joaquin Rivers (Busby *et al.* 1996). Steelhead were found from the upper Sacramento and Pit River systems (now inaccessible due to Shasta and Keswick Dams) south to the Kings and possibly the Kern River systems (now inaccessible due to extensive alterations from numerous water diversion projects) and in both east and west-side Sacramento River tributaries (Yoshiyama *et al.* 1996). The present distribution has been greatly reduced (McEwan and Jackson 1996). The California Advisory Committee on Salmon and Steelhead (1988) reported a reduction of steelhead habitat from 6,000 miles historically to 300 miles. Historically, steelhead probably ascended Clear Creek past the French Gulch area, but access to the upper basin was blocked by Whiskeytown Dam in 1964 (Yoshiyama *et al.* 1996).

Historic Central Valley steelhead run sizes are difficult to estimate given the paucity of data, but may have approached one to two million adults annually (McEwan 2001). By the early 1960s the steelhead run size had declined to about 40,000 adults (McEwan 2001). Over the past 30 years, the naturally-spawned steelhead populations in the upper Sacramento River have declined substantially (see Appendix B: Figure 7). Hallock *et al.* (1961) estimated an average of 20,540 adult steelhead through the 1960s in the Sacramento River, upstream of the Feather River. Steelhead counts at the Red Bluff Diversion Dam (RBDD) declined from an average of 11,187 for the period of 1967 to 1977, to an average of approximately 2,000 through the early 1990s, with an estimated total annual run size for the entire Sacramento-San Joaquin system, based on RBDD counts, to be no more than 10,000 adults (McEwan and Jackson 1996, McEwan 2001). Steelhead escapement surveys at RBDD ended in 1993 due to changes in dam operations.

Nobriga and Cadrett (2003) compared coded wire tagged and untagged (wild) steelhead smolt catch ratios at Chipps Island trawl from 1998-2001 to estimate that about 100,000 to 300,000 steelhead juveniles are produced naturally each year in the Central Valley. In the draft *Updated Status Review of West Coast Salmon and Steelhead* (NMFS 2003b), the Biological Review Team (BRT) made the following conclusion based on the Chipps Island data:

If we make the fairly generous assumptions (in the sense of generating large estimates of spawners) that average fecundity is 5,000 eggs per female, 1 percent of eggs survive to reach Chipps Island, and 181,000 smolts are produced (the 1998-2000 average), about 3,628 female steelhead spawn naturally in the entire Central Valley. This can be compared with McEwan's (2001) estimate of 1 million to 2 million spawners before 1850, and 40,000 spawners in the 1960s.

The only consistent data available on steelhead numbers in the San Joaquin River basin come from California Department of Fish and Game (CDFG) mid-water trawling samples collected on the lower San Joaquin River at Mossdale. These data (see Appendix B: Figure 8) indicate a decline in steelhead numbers in the early 1990s, which have remained low through 2002 (CDFG 2003). In 2003, a total of 12 steelhead smolts were collected at Mossdale (CDFG, unpublished data).

Existing wild steelhead stocks in the Central Valley are mostly confined to the upper Sacramento River and its tributaries, including Antelope, Deer, and Mill Creeks and the Yuba River. Populations may exist in Big Chico and Butte Creeks and a few wild steelhead are produced in the American and Feather Rivers (McEwan and Jackson 1996). Recent snorkel surveys (1999 to 2002) indicate that steelhead are present in Clear Creek (J. Newton, FWS, pers. comm. 2002, as reported in NMFS 2003b). Because of the large resident *O. mykiss* population in Clear Creek, steelhead spawner abundance has not been estimated.

Until recently, steelhead were thought to be extirpated from the San Joaquin River system. Recent monitoring has detected small self sustaining populations of steelhead in the Stanislaus, Mokelumne, Calaveras, and other streams previously thought to be devoid of steelhead (McEwan 2001). On the Stanislaus River, steelhead smolts have been captured in rotary screw traps at Caswell State Park and Oakdale each year since 1995 (Demko *et al.* 2000). After 3 years of operating a fish counting weir on the Stanislaus River only one adult steelhead has been observed moving upstream, although several large rainbow trout have washed up on the weir in late winter (S.P. Cramer and Associates, Inc. 2005). It is possible that naturally spawning populations exist in many other streams but are undetected due to lack of monitoring programs (Interagency Ecological Program Steelhead Project Work Team 1999). Incidental catches and observations of steelhead juveniles also have occurred on the Tuolumne and Merced Rivers during fall-run Chinook salmon monitoring activities, indicating that steelhead are widespread, if not abundant, throughout accessible streams and rivers in the Central Valley (NMFS 2003b).

Both the BRT (NMFS 2003b) and the Artificial Propagation Evaluation Workshop (69 FR 33102) concluded that the Central Valley steelhead ESU presently are "in danger of extinction." Steelhead have been extirpated from most of their historical range in this region. Habitat concerns in this ESU focus on the widespread degradation, destruction, and blockage of freshwater habitat within the region, and water allocation problems. Widespread hatchery steelhead production within this ESU also raises concerns about the potential ecological interactions between introduced stocks and native stocks. Because the Central Valley steelhead population has been fragmented into smaller isolated tributaries without any large source population and the remaining habitat continues to be degraded by water diversions, the population remains at an elevated risk for future population declines.

As described in the Central Valley Research Opinion, factors affecting Central Valley steelhead and habitat include: 1) dam construction that blocks previously accessible habitat; 2) water development activities that affect water quality, water quantity, and hydrographs; 3) land use activities such as agriculture, flood control, urban development, mining, and logging; 4) hatchery operation and practices; 5) harvest activities; 6) ecosystem restoration actions; 7) natural conditions; and 8) scientific research. Large dams are present on almost every major tributary to the Sacramento River, San Joaquin River, and Delta, and block steelhead access to the upper portions of watersheds that represent approximately 80 percent of historical habitat. Water diversions directly entrain fish, and can affect habitat by reducing wetted areas and causing water temperatures to increase. Runoff from agricultural, urban, and other sources contains pollutants and suspended sediment, which affects water quality. Hatchery fish can compromise the genetic

integrity of wild stocks, and fishing pressure on wild stocks can increase during years of high hatchery production. Habitat restoration projects can temporarily cause disturbance and increased suspended sediment in waterways, but ultimately may increase habitat abundance and complexity, stabilize channels and streambanks, increase spawning gravels, decrease sedimentation, and increase shade and cover for salmonids. Cycles in ocean productivity and drought conditions can have corresponding effects on salmonid life history parameters such as growth, recruitment, and mortality. Scientific research can lead to harm, harassment, and death of listed salmonids, but generally is thought to affect only a small number of fish in this manner. The knowledge gained from scientific research may lead to improved management of listed ESUs, increased population sizes, and consequently increased likelihood of survival and recovery.

IV. ENVIRONMENTAL BASELINE

The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area; the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation; and the impact of State or private actions which are contemporaneous with the consultation in process (50 CFR §402.02). A detailed discussion of the factors affecting the species in each ESU is provided in the Central Valley Research Opinion.

A. Status of the Species in the Action Area

On February 10, 2005, NMFS issued Permit 1452 to the California Rivers Restoration Fund (CRRF) for hook-and-line angling and post-spawn carcass recovery of Central Valley steelhead in the Tuolumne River. The purpose of the work is to collect scales to examine growth patterns in an attempt to distinguish resident rainbow trout from anadromous *O. mykiss*. As discussed in the tiering document for Permit 1452 (NMFS 2005b), the adult holding area for Central Valley steelhead/rainbow trout in the action area of the Tuolumne River is the area between RM 40 and 52.2. A good estimate of the population status of adult Central Valley steelhead in this area is not available because biologists indicate that they are unable to distinguish between steelhead and non-anadromous rainbow trout in their sampling. Also, adults are believed to migrate into the river between January and May, a period between the normal sampling period for adult Central Valley fall-run Chinook salmon carcasses that occurs from October through December and snorkeling surveys for juvenile fish that occur from June to September.

CRRF, in conjunction with other conservation groups, submitted a legal brief to the Federal Energy Regulatory Commission in support of a petition by NMFS for modification of project structures and operations of the New Don Pedro Project on the Tuolumne River (CRRF 2003). This brief included anecdotal information collected by CRRF suggesting that the lower Tuolumne River now has a self-sustaining population of *O. mykiss* present.

Past catch rates indicate that the population size of steelhead/rainbow trout in the lower Tuolumne River may number in the hundreds of fish. NMFS considers resident rainbow trout in

this location to be part of the Central Valley steelhead ESU because they likely are similar genetically to co-occurring anadromous *O. mykiss* (69 FR 33102). Resident rainbow trout may produce offspring that migrate to the ocean and return to enter the breeding population of steelhead, which would buffer the extinction risk of the lower Tuolumne River population and the ESU by supporting the continuance of the anadromous life-history form.

B. Factors affecting the Species in the Action Area

McEwan (2001) concludes that the primary stressors affecting Central Valley steelhead all are related to water development and water management, and the single greatest stressor is the substantial loss of spawning and rearing habitat due to dam construction. La Grange Dam, located about RM 52 in the Tuolumne River, blocks salmonid migration to upstream habitat. Central Valley anadromous fish management and research primarily is focused on Chinook salmon and has led to less emphasis on Central Valley steelhead monitoring and restoration. FWS (1995) indicated that the Tuolumne River has a recreational rainbow trout fishery and that riffles and run/glides provide the only significant amounts of habitat for these fish. However, instream flows are managed for Chinook salmon rather than steelhead/rainbow trout. As a consequence, the amount of habitat suitable for Central Valley steelhead likely is less than it would be if instream flows were manipulated to benefit Central Valley steelhead in particular rather than fall-run Chinook salmon. Recent Anadromous Fish Restoration Program-funded actions to restore spawning gravel have focused on fall-run Chinook salmon as well.

V. EFFECTS OF THE PROPOSED ACTION

The purpose of this section is to identify the effects associated with NMFS's issuance of Permit 1280 on Central Valley steelhead in the lower Tuolumne River. The primary effects of the proposed activities on Central Valley steelhead will be related to harassment associated with intentional take by hook-and-line. Harassment generally leads to stress and other sublethal effects and is caused by observing, capturing, and handling fish. Other sampling activities will target juvenile Central Valley fall-run Chinook salmon, and are expected to affect only a small number of juvenile steelhead and no adults. TID has not proposed intentional lethal take of steelhead; however, unintentional mortality may occur during handling or after the fish has been released from any of the sampling means discussed.

A. Project Specific Effects

The TID fish sampling activities are likely to result in the capture and handling of juvenile Central Valley steelhead with seines, dip nets, RSTs, and electrofishers. Juvenile and adult Central Valley steelhead also will be targeted for capture with hook-and-line gear, and tissue samples will be obtained. A detailed description of the effects associated with capture by these methods is found in the Central Valley Research Opinion.

Net movement, confinement (*e.g.*, with larger, thrashing fish), and debris loading from actively-manipulated or moving sampling gears such as seines, RSTs, and dip nets may cause physical

injury or death to juveniles through abrasions and injury to the mucus covering of the scales and skin. In addition to physically wounding fish, injuries may result in secondary infections. Fish may be additionally stressed from handling, especially if the fish is kept out of the water before it is released or if it has not fully recovered from anesthetics before being returned to the river.

Electrofishing can result in a variety of effects from simple harassment to injury to the fish (adults and juveniles) and death. There are two major forms of injuries from electrofishing: hemorrhages in soft tissues and fractures in hard tissues. Only a few recent studies have examined the long-term effects of electrofishing on salmonid survival and growth (Dalbey *et al.* 1996, Ainslie *et al.* 1998). These studies indicate that although some fish suffer spinal injury from electrofishing, few die as a result. However, Dalbey *et al.* (1996), report that the growth of rainbow trout was markedly lower when fish were subject to moderate to severe electrofisher-induced spinal injury. Electrofishing also can result in trauma to fish from stress. Recovery from this stress can take up to several days, and during this time the fish are more vulnerable to predation, and less able to compete for resources. Stress-related deaths also can occur within minutes or hours of release, with respiratory failure usually the cause.

The injury rate for juveniles from electrofishing tends to be much less than that for adults, and adults are not expected to be encountered during the electrofishing activities proposed by TID. McMichael *et al.* (1998) found a 5.1 percent injury rate for juvenile steelhead captured by electrofishing in the Yakima River subbasin. Injury potential from electrofishing is affected by electrical wave form, as well as by the experience and technique of the sampling crew.

TID has observed no mortalities of Central Valley steelhead in 2 years of prior sampling using similar methods. Prior fish collection with seines, RSTs, and electrofishers, and through seine/dip net salvage from flood plain depressions resulted in the capture and release of three juvenile *O. mykiss* with no observed mortality.

Capture by hook-and-line may result in injuries to the fish that may include damage to the skeletal structure of the mouth, injury to gills, and secondary infections. Tissue sampling for genetic identification will cause physical injury to one or more fins and to the skin by the removal of scales. Fish may be additionally stressed from handling, especially if the fish is kept out of the water before it is released.

Based on prior experience with the research techniques and protocols that would be used to conduct the proposed scientific research (see section II (*Description of the Proposed Action*)), NMFS expects that 1 percent (*i.e.*, one fish) or less of the juveniles or adults captured and handled will die. Unintentional mortality and stress should be minimized in particular if the work is conducted by trained and experience personnel, and by not collecting fish for sampling purposes when water temperatures exceed 60 °F.

As indicated above, past catch rates indicate that the population size of *O. mykiss* in the Tuolumne River may number in the hundreds of fish. The requested amount of take for Central Valley steelhead is not expected to result in a significant effect at the scale of the ESU because

the anticipated mortality rates are low. Additionally, NMFS believes that in the lower Tuolumne River, the presence of resident rainbow trout is likely to buffer the extinction risk to the anadromous population by providing offspring that migrate to the ocean and enter the breeding population of steelhead.

B. Beneficial Effects of Issuing the Permit

The status reviews for the Central Valley steelhead lament the lack of data available for making satisfactory management decisions (Busby *et al.* 1996). The lack of reliable and widespread abundance and trend data is in itself a risk factor for Central Valley steelhead. Access to useful scientific information is essential to implement the ESA adequately. Scientific information is necessary to reduce uncertainty in determining whether a consultation is to be conducted formally or informally; when determining whether a jeopardy threshold is met; or when developing terms and conditions, reasonable and prudent measures, and reasonable and prudent alternatives. Also, monitoring activities can help NMFS determine if protective actions are assisting in the recovery of Central Valley steelhead.

C. Summation of Project Effects

NMFS expects that the research, even if the maximum permitted take is reached, will have no more than a negligible adverse effect on the steelhead population within the lower Tuolumne River or the Central Valley steelhead ESU. Despite the fact that fish are harassed and even killed in the course of research, only a small fraction of available habitat is sampled. Therefore, only a small proportion of the total population is subject to sampling and the loss to the total population is small (McMichael 1993). The take prohibitions (4(d)rule) for Central Valley steelhead (65 FR 424222) highlight the value of research in the recovery process, acknowledge the paucity of research data, and encourage scientific research. NMFS believes that information derived from the TID study will make a significant contribution to the body of science on salmonid biology and assist in management decisions that may lead to the conservation and recovery of salmonids.

VI. CUMULATIVE EFFECTS

Cumulative effects are defined in 50 CFR part 402.02 as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." Future Federal actions, including the ongoing operation of hatcheries, water diversions, and some land management activities, will be reviewed through separate section 7 consultations and not considered here. A general summary of potential cumulative effects that may affect Central Valley steelhead within the action area is described in the Central Valley Research Opinion. These factors include: (1) dam construction that blocks previously accessible habitat; (2) water development activities that affect water quantity, water quality, and hydrographs; (3) land use activities such as agriculture, flood control, urban development, mining, and logging; (4) hatchery operations and practices; (5) harvest activities; (6) ecosystem restoration actions; (7) natural conditions; and (8) scientific research. Large dams are present on almost every major tributary to the Sacramento and San Joaquin

Rivers, and block Chinook salmon and steelhead access to the upper portions of watersheds that represent approximately eighty percent of the historical habitat.

VII. CONCLUSION

After reviewing the best available scientific and commercial data, the current status of Central Valley steelhead, the environmental baseline for the action area, the effects of the proposed issuance of Permit 1280, and the cumulative effects, it is NMFS' biological opinion that the issuance of Permit 1280, as proposed, is not likely to jeopardize the continued existence of Central Valley steelhead.

VIII. INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and 7(c)(2), taking that is incidental to and not intended as part of the proposed action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this incidental take statement.

The issuance of Permit 1280 authorizes the annual intentional take of up to 20 juvenile Central Valley steelhead and an additional 20 juvenile or adult Central Valley steelhead annually associated with TID's proposed research activities. The action of issuing Permit 1280 does not anticipate incidental take of endangered or threatened species, and no incidental take is authorized. This biological opinion does not authorize any taking of a listed species under section 10(a), or immunize any actions from the prohibitions of section 9(a) of the ESA.

IX. REINITIATION OF CONSULTATION

This concludes formal consultation on the issuance of Permit 1280. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded, (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered, (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in this amendment to the Central Valley

Research Opinion, or (4) a new species is listed or critical habitat designated that may be affected by the identified action.

X. LITERATURE CITED

- Ainslie, B.J, J.R. Post, and A.J. Paul. 1998. Effects of pulsed and continuous DC electrofishing on juvenile rainbow trout. *North American Journal of Fisheries Management* 18:905-918.
- Busby, P.J., T.C. Wainwright, G.J. Bryant, L. Lierheimer, R.S. Waples, F.W. Waknitz, and I.V. Lagomarsino. 1996. Status review of west coast steelhead from Washington, Idaho, Oregon, and California. U.S. Department of Commerce, National Oceanic and Atmospheric Administration Technical Memo NMFS-NWFSC-27. 261 pages.
- California Advisory Committee on Salmon and Steelhead. 1988. Restoring the Balance, a report to the Legislature and the Department of Fish and Game, #124-J. 84 Pages.
- California Department of Fish and Game. 2003. Memorandum to Madelyn Martinez (NMFS) regarding steelhead populations in the San Joaquin River basin. 4 pages.
- California Rivers Restoration Fund. 2003. Conservation group's brief in support of the petition of the National Marine Fisheries Service for modifying structures and operations. New Don Pedro project, Docket No. P-2299-000. Available: (<http://www.calriversfund.org/Current%20Projects.html>)
- Dalbey, S.R., T.E. McMahon, and W. Fredenberg. 1996. Effect of electrofishing pulse shape and electrofishing-induced spinal injury on long-term growth and survival of wild rainbow trout. *North America Journal of Fisheries Management* 16:560-569.
- Demko, D.B., C. Gemperle, A. Phillips, and S.P. Cramer. 2000. Outmigrant trapping of juvenile salmonids in the lower Stanislaus River, Caswell State Park site, 1999. Prepared for U.S. Fish and Wildlife Service. Prepared by S.P. Cramer and Associates, Inc. Gresham, OR. 146 pages plus appendices.
- Hallock, R.J., W.F. Van Woert, and L. Shapavalov. 1961. An evaluation of stocking hatchery-reared steelhead rainbow trout (*Salmo gairdneri gairdneri*) in the Sacramento River system. *California Fish and Game* 114:73.
- Interagency Ecological Program Steelhead Project Work Team. 1999. Monitoring, assessment, and research on Central Valley steelhead: status of knowledge, review existing programs, and assessment needs. In Comprehensive Monitoring, Assessment, and Research Program Plan, Tech. App. VII.

- McEwan, D. 2001. Central Valley steelhead. Pages 1-44 in R. L. Brown (Editor). Contributions to the Biology of Central Valley salmonids, Volume 1. California Department of Fish and Game. Fish Bulletin 179.
- McEwan, D., and T.A. Jackson. 1996. Steelhead restoration and management plan for California. California Department of Fish and Game, Sacramento.
- McMichael, G.A. 1993. Examination of electrofishing injury and short-term mortality in hatchery rainbow trout. North American Journal of Fisheries Management 13:229-233.
- McMichael, G.A., A.L. Fritts, and T.N. Pearsons. 1998. Electrofishing injury to stream salmonids: injury assessment at the sample, reach, and stream scales. North American Journal of Fisheries Management 18:894-904.
- National Marine Fisheries Service. 2000. Guidelines for electrofishing waters containing salmonids listed under the Endangered Species Act. June 2000.
- National Marine Fisheries Service. 2003a. Memorandum dated September 5, 2003, from Rodney R. McInnis to The Record. Endangered Species Act section 7 programmatic biological opinion on the issuance of section 10(a)(1)(A) scientific research permits for take of endangered Sacramento River winter-run Chinook salmon, threatened Central Valley spring-run Chinook salmon, and threatened Central Valley steelhead.
- National Marine Fisheries Service. 2003b. Draft Report of Updated Status of Listed ESUs of Salmon and Steelhead. NMFS, Northwest Fisheries Science Center, Seattle, Washington. Available: (<http://www.nwfsc.noaa.gov/cbd/trt/brt/brtpt.html>)
- National Marine Fisheries Service. 2005a. Species of concern and candidate species. Available: (<http://www.nmfs.noaa.gov/pr/species/concern/>)
- National Marine Fisheries Service. 2005b. Memorandum dated February 10, 2005, from Rodney R. McInnis to The Record (Scientific Research Permit No. 1452, 151422SWR03SA9032:BSK). Addendum to the Endangered Species Act section 7 programmatic biological opinion on the issuance of section 10(a)(1)(A) scientific research permits for take of endangered Sacramento River winter-run Chinook salmon, threatened Central Valley spring-run Chinook salmon, and threatened Central Valley steelhead.
- Nobriga, M., and P. Cadrett. 2003. Differences among hatchery and wild steelhead: evidence from Delta fish monitoring programs. Interagency Ecological Program for the San Francisco Estuary Newsletter 14:3:30-38.
- S.P. Cramer and Associates, Inc.. 2005. Stanislaus River rotary screw trap monitoring data. Available: (<http://spcramer.com/spcramer.html>)

- Schoettger, R.A., and E.W. Steucke. 1970. Synergic mixtures of MS-222 and quinaldine as anesthetics for rainbow trout and northern pike. *The Progressive Fish-Culturist* 1970:202-205.
- Turlock Irrigation District and Modesto Irrigation District. 1996. New Don Pedro Proceeding P-2299-024 Settlement Agreement. Appendix I in Federal Energy Regulatory Commission, Reservoir release requirements for fish at the New Don Pedro Project, California. FERC Project No. 2299-024. Final Environmental Impact Statement, FERC-EIS-0081-D. FERC, Office of Hydropower Licensing, Washington, D.C.
- U.S. Fish and Wildlife Service. 1995. The Relationship between Instream Flow and Physical Habitat Availability for Chinook Salmon in the Lower Tuolumne River, California. Lower Tuolumne River Instream Flow Incremental Methodology Report, Sacramento.
- Yoshiyama, R.M., E.R. Gerstung, F.W. Fisher, and P.B. Moyle. 1996. Historical and present distribution of Chinook salmon in the Central Valley drainage of California. Sierra Nevada Ecosystem Project: final report to Congress. Pages 309-362 in Volume 3. Assessments, commissioned reports, and background information. University of California, Center for Water and Wildland Resources, Davis.